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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,966	09/22/2000	ZEWU CHEN	0444.035	1170

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EXAMINER

BARBER, THERESE

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 11/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/667,966

**Applicant(s)**

CHEN, ZEWU

**Examiner**

Therese Barber

**Art Unit**

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 41-50 is/are pending in the application.
- 4a) Of the above claim(s) 2, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-13, 18-24, 49 and 50 is/are rejected.
- 7) ☒ Claim(s) 14-17 and 41-48 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The reference AH, originally listed on the information disclosure statement, submitted on 5 March 2002, has been corrected.

### ***Drawings***

2. The corrected or substitute drawings were received on 23 September 2002. These drawings are approved.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-7, 9, 10-13 and 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wittry (USPN 5,892,809) and Ohsugi et al. (USPN 5,249,216).
5. Regarding claims 1, 3-7, 9, 10-13 and 18-24, Wittry fails to disclose that the surface is an optical reflection surface, the surface is a semiconductor wafer and that foreign matter is present on the surface.
6. Regarding claims 1, 3-7, 9, 10-13 and 18-24, Wittry discloses a total reflection x-ray fluorescence apparatus (col. 5, lines 24-26) comprised of an x-ray source for providing x-ray

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(col. 5, lines 51-61); a doubly-curved x-ray optic for diffracting and focusing the x-rays provided by the x-ray source (10 and 11; col. 3, lines 33-34); a surface onto which at least some of the diffracted and focused x-rays are directed (30); an x-ray detector for detecting resultant x-ray fluorescence (col. 3, lines 37-40); wherein the doubly-curved x-ray optic is a crystal or a multi-layer x-ray optic (col. 6, lines 54-62); wherein the doubly-curved x-ray optic has one or more atomic planes (col. 3, lines 16-20); wherein the atomic planes are curved to form a toroidal, ellipsoidal, spherical, parabolic, or hyperbolic shape (col. 3, lines 16-20); wherein the one or more apertures for limiting the convergent angle of the diffracted x-rays (27; col. 6, lines 38-40) are positioned before the doubly curved x-ray optic (fig. 3); wherein the one or more aperture produced a convergent angle for the diffracted x-rays (fig. 1); wherein the doubly-curved x-ray optic employs Bragg's law in diffracting the x-rays (col. 3, lines 20-25); and an analyzer for analyzing the x-ray fluorescence detected by the detector (col. 7, lines 49-54; fig. 6).

Ohsugi discloses a total reflection x-ray fluorescent apparatus (figs. 3 and 4) wherein the surface is an optical reflection surface, the surface is a semiconductor wafer and that foreign matter is present on the surface (col. 2, lines 6, lines 9-11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made the surface of the sample of the total reflection x-ray fluorescence apparatus as disclosed by Wittry could be modified to incorporated a semiconductor wafer having an optical reflection surface as disclosed by Ohsugi. Accordingly, the motivation is the resultant structure will be utilized in analyzing surface contamination on the surface of a semiconductor wafer, thereby, reducing the cost of manufacturing semiconductor wafers by testing a number of waters to determine if any particles are located on the surfaces of the semiconductor wafers.

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7. Claims 8, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wittry and Ohsugi.

8. Regarding claims 8, 49 and 50, Wittry fails to disclose that the apertures are elongated slots and that the one or more apertures are positioned after the x-ray optic.

Wittry discloses a total reflection x-ray fluorescence apparatus (col. 5, lines 24-26) comprised of an x-ray source for providing x-ray (col. 5, lines 51-61); a doubly-curved x-ray optic for diffracting and focusing the x-rays provided by the x-ray source (10 and 11; col. 3, lines 33-34); a surface onto which at least some of the diffracted and focused x-rays are directed (30); an x-ray detector for detecting resultant x-ray fluorescence (col. 3, lines 37-40); and wherein the one or more apertures for limiting the convergent angle of the diffracted x-rays (27; col. 6, lines 38-40). Furthermore, Wittry discloses that the apertures can be utilized to obtain electron beam spot sizes that are different in size depending upon the current (col. 6, lines 38-40).

Ohsugi discloses a total reflection x-ray fluorescent apparatus (figs. 3 and 4) wherein x-ray emission are collimated to a fine x-ray beam by a slit (2; col. 7, line 68 and col. 8, lines 1-2) and x-rays are incident onto the detector via a slit (5; col. 8, lines 18-21) and that the slit(s)

It would have been obvious to one having ordinary skill in the art at the time the invention was made the apertures of the total reflection x-ray fluorescence apparatus as disclosed by Wittry could be modified to incorporated to a slit as disclosed by Ohsugi. Accordingly, the motivation is the resultant structure will be able to minimize the amount of x-rays that are incident to the x-ray optics, thereby, preventing any scattered x-rays from striking the surface of the sample or to control the size of the x-ray beam as it enters the detector, depending upon the positioning of the slit apertures within the total reflection x-ray apparatus.

***Allowable Subject Matter***

9. Claims 14-17 and 41-48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 14-17, the prior art fails to teach or to reasonably suggest wherein a total reflection x-ray fluorescence apparatus comprised of a x-ray source for providing the x-rays; a doubly-curved x-ray optic for diffracting the x-rays, a surface onto which at least some of the diffracted x-rays are directed; an x-ray detector for detecting the resultant x-ray fluorescence emitted by any foreign matter present on the surface; wherein the locations of the doubly-curved x-ray optic, x-ray source, and point of impingement upon the surface define an optical circle of radius  $R$ , wherein the doubly-curved x-ray optic has an optical surface of radius  $2R$  and one or more atomic planes are essentially parallel with the optic surface, as set forth in the claimed combination.

Regarding claims 41-48, the prior art fails to teach or to reasonably suggest wherein a total reflection x-ray fluorescence apparatus comprised of a x-ray source for providing the x-rays; a doubly-curved x-ray optic for diffracting the x-rays, a surface onto which at least some of the diffracted x-rays are directed; an x-ray detector for detecting the resultant x-ray fluorescence emitted by any foreign matter present on the surface; the x-ray source and the point of impingement upon the surface define an optic circle of radius  $R$ , and wherein the doubly-curved x-ray optic comprises a surface and a plurality of atomic plane of radius  $R_p$ , which intersect the surface at an angle  $\alpha$ ; and wherein the radius of the atomic planes  $R_p$  of the doubly-curved optic is defined by the equation  $R_p = 2R \cos \alpha$ , as set forth in the claimed combination.

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***Response to Amendment***

10. The applicant elected claims 1-17 and 18-24 in response to a restriction requirement on 21 December 2001. The applicants added claims 41-48, cancelled claims 32-40 and claims 25-31 were not elected for examination. The applicant added claims 49-50 and cancelled claims 2, 19 and 20.


11. The examiner has withdrawn Hornstra and Tiffin as the primary references for the 35 U.S.C. 102(b) rejections and 35 U.S.C. 103(a) rejections.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Therese Barber whose telephone number is (703) 306-0205. The examiner can normally be reached on Monday to Friday from 8:30 a.m. to 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-4857 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

tb   
October 24, 2002

  
ROBERT H. KIM  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2000